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Application of The Case-Based Method to Critical Thinking Based on Learning Motivation in Students of The Population Geography Course

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Abstract: This study investigated the effectiveness of a case-based learning (CBL) approach in improving students' critical thinking skills in the Population Geography course at Universitas Negeri Padang. A quasi-experimental design was employed involving two classes: an experimental class receiving CBL and a control class receiving conventional instruction. Students with low, medium, and high initial abilities participated in the study. Data were collected through classroom observations and pretest–posttest assessments of critical thinking and analyzed using an independent-samples t-test and N-gain analysis with SPSS. The pretest results indicated no significant difference between the experimental and control groups, confirming comparable initial abilities. However, the posttest revealed a significant improvement in the experimental group compared with the control group. The experimental class achieved a higher mean posttest score (14.56) than the control class (9.85), with N-gain values of 84% and 31%, respectively, indicating substantially greater learning effectiveness. Further analysis showed that learning motivation did not significantly interact with the implementation of CBL in influencing critical thinking. The findings demonstrate that case-based learning effectively enhances critical thinking skills in Population Geography, regardless of students' motivation levels, and supports its integration into geography education to promote higher-order thinking.

Keywords: Case-Based Method; Critical Thinking; Motivation; Population Geography Course

Introduction

Population Geography is one of the Field of Study Courses that must be followed by students in the Department of Geography, Social Science Faculty, Universitas Negeri Padang, both in the Geography Education Study Program and the Geography Study Program, with a credit load of 2 credits. Population Geography can be defined as the study of population and its dynamics from a spatial approach (Birdsall et al., 2001; Entwisle, 2007; Newbold, 2014). The focus of Population Geography revolves around the following: human population, size, and distribution, including population dynamics in spatial areas. Population Geography also focuses on past and present trends in population growth and their spatial manifestations; components of population dynamics, including: fertility, mortality and migration; as well as the composition and structure of the population, encompassing a series of demographic characteristics (such as age-sex, marital status and average age at marriage, and others.); social characteristics (such as caste, race/ethnicity, religion and language), population composition; literacy and level of educational attainment and others); and economic characteristics (such as labor participation rates and labor structures and others) (Barcus & Halfacree, 2017; Raymer et al., 2019; Skop, 2006).

The discussion of Population Geography, which concerns residents, their living arrangements, and the problems they cause, requires a learning model and

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method that provides space for students to develop their knowledge and ability to analyze various population problems while finding the best solution to these problems. Current research trends on population geography in various countries around the world reflect dynamic social, economic, and environmental changes (Birdsall et al., 2001; Hassan, 2020). In many developing countries, urbanization is the main focus of research, where the phenomenon of population movement from rural areas to large cities demands attention to issues of social inequality, urban poverty, and urban space management (Suasti, 2019). Meanwhile, in developed countries, the challenges that arise are more related to declining birth rates and population aging, which encourage research on the socio-economic impacts of declining workforces and the need for services for the elderly. In addition, migration, both international and internal, is an important topic that connects global and local dynamics, with a focus on the social, economic, and cultural impacts of population movements, as well as issues of immigrant integration in destination countries

Research is also increasingly highlighting the impact of climate change on population distribution patterns, especially in coastal or disaster-prone areas, as well as the environmental resilience challenges faced by certain communities. Technology, especially geographic information systems (GIS) and big data, is playing an increasingly important role in identifying demographic patterns and trends more precisely, enabling researchers to design more efficient and data-driven development policies (Chen, 2024; Jia et al., 2023; R. Yang et al., 2019). Furthermore, GIS analysis to understand how the population is distributed geographically can help the government allocate resources more efficiently. For example, they can allocate funds for the development of infrastructure, health facilities, schools, and public services based on population concentration and distribution. Overall, population geography research now encompasses a wide range of interrelated aspects, from the internal and external dynamics of population movements to their impact on sustainable development policies amidst global challenges. Related to this, the case learning model becomes very urgent to adapt to the Population Geography class.

Students should be encouraged to promote creativity, decision-making, critical and analytical thinking, and thus, find solutions to real-world problems. Students must be trained to be critical readers who can question, organize, interpret, synthesize, and digest what they read (Abdi, 2012; Barta et al., 2022; Paul & Elder, 2004). To improve students' knowledge, skills, and critical thinking dispositions, educators can develop pedagogical learning with directed learning activities that encourage critical thinking skills. Students should be taught how to think critically, and this should be done through often and explicitly modeling the teacher of critical thinking skills (Gojkov et al., 2015; Larsson, 2017; Ünsar & Engin, 2013).

Learning motivation plays a crucial role in learning geography in college because it can increase student engagement and understanding of the material taught (Ababio, 2013; Chukwudi, 2022.). In the context of geography, which includes spatial analysis, environmental change, and global socio-economic issues, high motivation encourages students to dig deeper into topics relevant to their daily lives. When students feel motivated, they are more likely to actively participate in class discussions, conduct research, and connect theories with real-world phenomena (Jamil et al., 2019; Wijayanto et al., 2017). This not only enriches their academic understanding but also prepares them to face the challenges of the professional world in the future. However, there are several problems that can hinder learning motivation in geography learning in higher education. One of them is the lack of relevance of the material to real life, which often makes students feel that geography material is not interesting or difficult to understand. Less innovative teaching methods, such as monotonous lectures or a lack of use of technology, can reduce students' interest in being actively involved in learning.

The theoretical foundation of this study is grounded in constructivist learning theory, which argues that knowledge is actively constructed through learners' interaction with authentic contexts, problem-solving activities, and social collaboration rather than through passive knowledge transmission (Piaget, 1972; Vygotsky, 1978). This perspective is closely aligned with case-based learning, where students analyze complex real-world situations, evaluate alternative solutions, and justify decisions using evidence. Furthermore, critical thinking theory proposed by Paul and Elder (2004) emphasizes that higher-order thinking develops when learners are continuously engaged in interpreting information, analyzing assumptions, evaluating evidence, and drawing logical conclusions. These theoretical perspectives are particularly relevant to Population Geography because the discipline requires students to understand multidimensional demographic issues, interpret spatial data, and formulate evidence-based solutions to contemporary population challenges.

Despite the increasing adoption of student-centered learning in higher education, empirical evidence regarding the effectiveness of case-based learning in Population Geography remains limited, particularly in Indonesian universities. Moreover, previous studies have predominantly focused on cognitive achievement, while the influence of learning motivation on the relationship between case-based learning and critical thinking has received little attention. Therefore, this

study was conducted to address these gaps by examining the effectiveness of case-based learning in enhancing students' critical thinking skills and investigating whether learning motivation moderates this relationship in the context of Population Geography.

Case discussion is a tool, like a person or student, to understand the real class, test knowledge, and harmonize the discourse; they must be able to solve various existing problems directly. The case method, according to Sato (2010) 1980s has gained traction in the world of education. Usually, cases are in the form of narratives taken from real-life examples and used as learning tools to actualize group discussion activities and individual reflections (Sato & Rogers, 2010). Many education researchers state that learning is not only a process that occurs inside the mind of the individual, but also related to the context of physical and social activity. Such learning situations, including interactions with others, the environment, and the physical and symbolic tools used, are a fundamental part of learning itself.

Method

Research Design

This study is a quasi-experimental study divided into two groups, namely the experimental class and the control class, which were taken randomly. The study was conducted on the Population Geography Course, each with a weighting of 2 credits, in the Geography Department, Faculty of Social Sciences, Universitas Negeri Padang. Both classes have similarities in the average results of the formative test scores. The study began with a pretest in both classes as a reference to determine the initial critical thinking abilities of students in Population Geography learning. After being given treatment, students were then given a posttest to see the extent to which students' critical thinking abilities changed as a result of the intervention or treatment.

Table 1. Research Design

C	B	A	
		A1	A2
C1	B1	X	O
	B2		
	B3		
C2	B1	O	X
	B2		
	B3		

Description:
C: Groups
C1: Experimental Group
C2: Control Group
A: Learning Model
A1: Case-based Learning
A2: Discussion
B: Student's Motivation
B1: High Level of Motivation
B2: Middle Level of Motivation
B3: Low Level of Motivation
X: Receive Treatment
O: Not Receive Treatment

Research Participant

The population in this study was all students taking the Population Geography Course at the Department of Geography, Faculty of Social Sciences, Universitas Negeri Padang. Sampling was done randomly, namely, one experimental class and one control class. Both classes have grades with an average of the 4 existing classes. The Population Geography course, which totaled 39 people, consisted of 25 people in the experimental class and 14 people in the control class. The sampling technique was total sampling. The location of this study was at the Department of Geography, Faculty of Social Sciences, Universitas Negeri Padang, Jalan Prof. Dr. Hamka, Padang Utara District, Padang City, West Sumatra Province. This study was conducted for 6 meetings that took place in a structured manner with a lesson plan.

Data Collecting Technique

This study was conducted to see the implementation of case-based methods and their effectiveness on critical thinking skills and learning motivation. The data collection technique was carried out by observation to see the application of the case-based method by the learning syntax. In the process of taking critical thinking skills and learning motivation, using adapted test instruments and modifications from expert theories (Ababio, 2013; Ennis, 1991; Facione, 2022.; Lau, 2011). The research instrument has been tested for its normality, homogeneity, validity, and reliability, and declared valid.

Data Analysis

The data obtained in this study consisted of observation data from the learning process, pretest data, and posttest data. The learning process data was described descriptively to explain how the case-based method was implemented. The pretest and posttest data were subjected to statistical testing. The pretest and posttest data are interpreted into the gain index, as in Table 2.

Table 2. N-Gain

N-Gain Value	Category
$G > 0.7$	High
$0.3 \leq g \leq 0.7$	Moderate
$G < 0.3$	Low

(Hake, 1999)

Then, the data of critical thinking ability results were analyzed using SPSS with an independent sample T-test. The hypothesis of this study is:
Ho = The application of the Case-Based Method Learning Model does not have a better influence on critical thinking in students of population geography courses, due to the absence of significant differences between the scores of the experimental class and the control class
Ha = The application of the Case-Based Method Learning Model has a better influence on critical thinking in students of population geography courses, because there is a significant difference between the scores of the experimental class and the control class.
While the interaction between case-based learning and learning motivation towards critical thinking using ANOVA. The hypothesis of this study is:
Ho = Is there an interaction between case-based learning and learning motivation towards critical thinking
Ha = There is no interaction between case-based learning and learning motivation towards critical thinking.

Result and Discussion

Result
Learning Activities in Population Geography Course

The experimental class is given a stimulus by applying a case-based learning model, including the following steps: (1) determining learning objectives, (2) organizing students. In the first and second steps, students are asked to give their opinions on images and data graphs related to the material or case being discussed. In this context, it is population growth and mobility based on a particular region. The teacher provides guidance to identify problems and solutions to population growth and mobility. (3) The third step, the teacher encourages students to find relevant information so they gain insight to solve population problems. Finally, the teacher helps students prepare for the presentation of the final results. The details of the steps are shown in Table 3.

Table 3. Steps of Case-Based Method Learning

Steps	Lecturer Activities	Student Activities
Determining learning objectives	- Communicating learning objectives - Present cases related to Population Growth and Mobility. - The cases provided are in the form of population dynamics data (population growth and mobility) in several regions for 10 years, which are presented in the form of graphics and videos. - Motivating for every student to be involved in problem-solving efforts for existing population problems.	Students individually read the given cases to understand various terms and concepts, problems, and problem-solving contained in the cases.
Student Organizing and brainstorming	- Divide students into groups. - Help students organize assignments relevant to the issue raised - Ask students for their opinions on the images and videos provided, and guide them to identify the problems that arise and solve the problems in the existing regions.	- Students sit in groups. Each student conveys the information they get about population problems (population growth and mobility) - Organize materials/tasks according to the case raised, and specify factual issues - To address the problems of the population and to solve problems.
Collection of information relevant to the case	- Encourage students to collect information that is relevant to the theme being learned. - Ask students to fill out Worksheets to help them investigate, delve into the material to find problem-solving solutions according to the given theme.	- Students gather relevant information. - Filling out worksheets.
Data presentation	- Guiding and assisting students in the process of planning and presenting final results. (Population data of the theme learned in the last 10 years in the form of graphics, videos, and reports). - Asking students to record the results of their research on a worksheet, processing population data according to the theme.	- Presenting data, problems and solving population problems (population growth and mobility) in the form of infolines and videos. - Fill out student worksheets related to data, population problems and their solutions.
Evaluation and reflection	- Directing students to reflect and evaluate their work results. - Instructing students to analyze the results of solving problems about population growth and increase as well	- Presentation of the results of the work on population problems and problem-solving efforts.

Steps	Lecturer Activities	Student Activities
	as population mobility problems as well as asking students to make presentations in front of the class. - Equalizing perceptions of population problems (population growth and mobility) as well as problem-solving efforts. - Conducting reflection with students.	- Analyze the proposed problem-solving strategies.

Source: (Block, 1996; Pihlanto, 1994; Sato & Rogers, 2010)

Pretest and Posttest Results of the Case-Based Method

The data in this study were obtained from the assessment test of students' critical thinking ability, which concerns four aspects of critical thinking, namely, students can express facts, can formulate data into mathematical models (STEAM), are able to solve problems, and are able to provide assessments. The tests carried out in this study were pretests carried out before the model application and posttest activities carried out at the end of teaching and learning activities. Pretest-posttest activities were carried out in two sample classes, namely the experimental class and the control class. The data obtained from the posttest test is used as material for analyzing the differences in critical thinking ability of the experimental class and the control class.

Table 4. Descriptive Data of Pretest Results

Class	N	Mean	Maximum Score	Minimum Score
Experiment	25	7.08	10	4
Control	14	7.07	9	5

Source: Primary Data Analysis

The results of the pretest of critical thinking ability of students with the highest scores in the experimental class obtained a score of 10, and the control class obtained a score of 4. The lowest score of the experimental class is lower than the value of the control class, namely, with the acquisition of the experimental class score of 4 and the control class with a value of 5. With a difference in the average value that is not much different, namely with a difference of 0.01, with an average gain of the experimental class of 7.08 and the control class of 7.07.

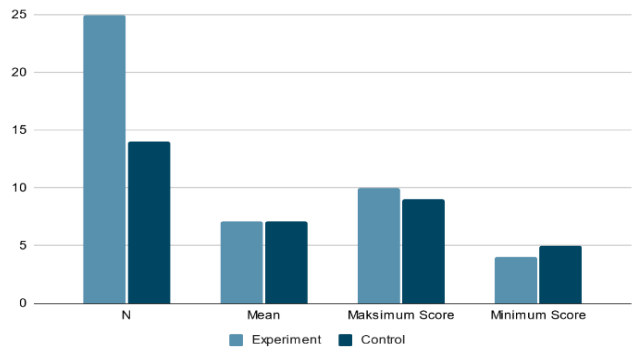

Figure 1. Pretest Test Graph of Students' Critical Thinking Ability

In Figure 1, the results of the pretest of critical thinking ability are the highest value obtained by the experimental class, and the lowest score is also obtained by the experimental class. So, the results of the pretest are evenly distributed in the two classes, so that it can be concluded that the initial critical thinking ability of students in the experimental and control classes is no different and is still in the same category.

Table 5. Descriptive Data of Posttest Result

Class	N	Mean	Maximum Score	Minimum Score
Experiment	25	14.56	16	12
Control	14	9.85	12	7

Source: Primary Data Analysis

In Table 5, the posttest results of critical thinking skills of students with the highest scores in the experimental class obtained a score of 16, and the control class obtained a score of 12. The lowest score of the experimental class is higher than the value of the control class, with the experimental class score of 12 and the control class value of 7. With a difference in the average of different values, namely, with the average gain of the experimental class of 14.56 and the control class of 9.85.

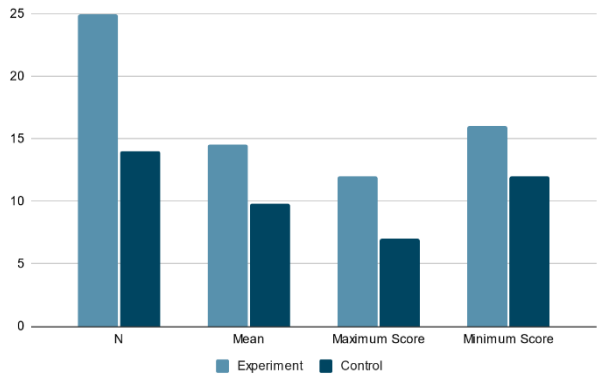

Figure 2. Posttest Test Graph of Students' Critical Thinking Ability

In Figure 2, the results of the posttest of critical thinking ability are the highest value obtained by the experimental class, and the lowest value is also obtained by the control class. So, the results of the posttest are higher in the experimental class, so it can be concluded that the final critical thinking ability of students in the

experimental class has a much better difference in scores than the control class.

Table 6. Descriptive Data of Experimental Class and Control Class: Pretest T-Test Results

Independent Sample T	Test Sig. (2-tailed)
Equal Variance Assumed	0.986
Equal Variances Not Assumed	0.986

Source: Primary Data Analysis 2022

In Table 6 of the results of the T pretest test of critical thinking ability carried out, the Sig. (2-tailed) value of 0.986, which is greater than 0.05, so it can be decided that Ho is accepted and Ha is rejected, meaning that there is no significant difference between the experimental class value and the control class value before being treated using the Case Based Method Learning Model in the experimental class and the conventional learning model in the control class.

Table 7. Descriptive Data of Posttest T-Test Results of Experimental Classes and Control Classes

Independent Sample T	Test Sig. (2-tailed)
Equal Variance Assumed	0.001
Equal Variances Not Assumed	0.005

Source: Primary Data Analysis 2022

In Table 7 of the results of the posttest T test of critical thinking ability carried out, a Sig. (2-tailed) value of 0.001, which is less than 0.05, so it can be decided that Ho is rejected and Ha is accepted, meaning that there is a significant difference between the experimental class value and the control class value after being treated using the Case Based Method Learning Model in the experimental class and the conventional learning model in the control class.

Result of The Test of The Application of Case-Method Learning on Critical Thinking

In Table 8 of the results of the T pretest-posttest test of critical thinking ability carried out, a Sig value was obtained. (2-tailed) of 0.000, which is less than 0.05, so it can be decided that Ho is rejected and Ha is accepted, meaning that there is a significant difference between the pretest value of the experimental class and the posttest value of the experimental class after being given treatment using the Case-Based Method Learning Model in the experimental class.

Table 8. Descriptive Data of Experimental Class Pretest-Posttest T-Test Results

Independent Sample T	Test Sig. (2-tailed)
Equal Variance Assumed	0.000
Equal Variances Not Assumed	0.000

Source: Primary Data Analysis 2022

From Table 9 below, the results of the N-Gain calculation between the control class and the experimental class have differences. The Experimental Class has a score of 84%, of the class score increased. While the control class has an increase in value of 31%. This implies that experimental classes are learning effectively, but control classes are less effective, with an increase of less than 50%.

Table 9. N-Gain Calculation Results Data

Class	Minimum Score	Maximum Score	N-Gain	N-Gain (%)	Interpretation
Experiment	55.56	100	84.14	84	Effective
Control	-12.50	60	30.77	31	Ineffective

Interaction of Case-Based Method on Critical Thinking with Learning Motivation

The normality test criteria are if the Sig. Value <0.05, then the Standard Residual Value is not normally distributed; if >0.05, then it is normally distributed. Based on the table 10 below, the results of the normality test show normal data. This is proven by the results of Shapiro-Wilk with Sig. 0.348.

Table 10. Normality Test

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Standardized Residual for Critical_ Thinking	.081	39	.200*	.969	39	.348

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

Homogeneity test criteria, if the data variant has a Sig. Value <0.05, then the data variant is not homogeneous. Conversely, if the data has a Sig value > 0.05, then the data variant is homogeneous. In the table 11 below, the data variant value is 0.263. The research

data shows Sig. >0.05, then the data is classified as homogeneous.

Table 11. Homogeneity Test

		Levene Statistic	df1	df2	Sig.
Critical Thinking	Based on Mean	1.485	4	33	.229
	Based on the Median	.780	4	33	.546
	Based on Median and with adjusted df	.780	4	20.076	.551
	Based on the trimmed mean	1.376	4	33	.263

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.
a. Dependent variable: Critical_Thinking
b. Design: Intercept + Learning_Model + Motivation + Learning_Model * Motivation

The ANOVA test has criteria if the Sig. <0.05 value, then there is a significant difference in the use of case-based methods based on factor variables; conversely, if the Sig.> 0.05 value, then there is no significant difference in the use of case-based methods based on factor variables. Based on the table 12 below, the results show a Sig. 0.01 (<0.05), then there is a difference in the use of the case-based method model with students' critical thinking. Then in other results, the Sig. 0.418 (> 0.05). Hence, there is no difference between learning motivation and students' critical thinking. Furthermore, in other results, the Sig. 0.210 (> 0.05); therefore, there is no interaction between the use of the case-based learning model and learning motivation towards students' critical thinking.

Table 12. Two-Way ANOVA Test

Dependent Variable: Critical_Thinking					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	26413.517[a]	5	5282.703	21.674	<,001
Intercept	54658.714	1	54658.714	224.258	<,001
Learning_Model	9913.202	1	9913.202	40.673	<,001
Motivation	436.522	2	218.261	.895	.418
Learning_Model * Motivation	798.944	2	399.472	1.639	.210
Error	8043.146	33	243.732		
Total	199144.575	39			
Corrected Total	34456.663	38			

a. R Squared = .767 (Adjusted R Squared = .731)

Discussion

Learning Activities

This research aims to improve students' critical thinking skills and motivation through the implementation of the Case-Method model using authentic cases in the Population Geography course. Previous studies have demonstrated that case-based learning is an effective student-centered approach for developing higher-order thinking skills because it encourages learners to analyze complex problems, evaluate evidence, and construct solutions based on real-world contexts (Sato & Rogers, 2010; Thistlethwaite et al., 2012). In geography education, the use of authentic cases related to social and environmental issues has been reported to enhance students' analytical abilities, spatial reasoning, and engagement in learning because students are directly involved in interpreting phenomena that occur in their surroundings (Kerski, 2013; Jo & Bednarz, 2009). Furthermore, research by Herreid (2011) emphasized that case-based instruction can improve students' problem-solving abilities and facilitate meaningful discussions through collaborative learning activities.

The implementation of the Case-Method model in this study consists of several stages. The first stage involves establishing an agreement with students regarding the implementation of the case method, including the selection of cases and the assessment rubric. The second stage focuses on strengthening students' understanding of the topic "Growth and Mobility" as the conceptual foundation for case analysis. The third stage involves the lecturer presenting authentic cases related to population growth and mobility issues across provinces and regencies/cities in Indonesia. Students are required to study the provided materials and identify important population-related issues.

The fourth stage is case discussion conducted through small-group activities. Students analyze population growth and mobility problems based on individual studies and group discussions. Each group explores additional information from various sources,

including national and international scientific journals, to compare population dynamics in different countries or regions. In this stage, students also conduct mini field research to investigate population growth patterns, mobility characteristics, and related problems as empirical evidence for case identification. This activity is consistent with previous findings that inquiry-based and contextual learning experiences strengthen students' motivation and deeper understanding by connecting theoretical concepts with real-world situations (Prince, 2004; Yew & Goh, 2016).

The fifth stage involves developing solutions and presenting ideas to address population growth and mobility problems. Students validate identified issues, formulate evidence-based solutions, and prepare group reports. The sixth stage consists of classroom discussions where each group presents their analysis and proposed solutions. Finally, the lecturer provides assessment and feedback on the entire learning process. This reflective feedback stage is essential because previous research indicates that feedback and collaborative reflection contribute significantly to improving students' critical thinking performance and self-regulated learning (Hattie & Timperley, 2007).

Through these systematic stages, the Case-Method model provides opportunities for students to engage in problem analysis, collaborative reasoning, decision-making, and solution development. Therefore, this approach is expected to enhance critical thinking skills and learning motivation in Population Geography by transforming students from passive recipients of knowledge into active learners who construct understanding through authentic population issues.

The case-method model or case study in learning has become one of the effective ways to develop students' critical thinking skills. This method provides opportunities for students to be directly involved in situations or issues that often resemble real-world challenges. (Abdi, 2012; Ay et al., 2015; Careaga-Butter et al., 2020). By presenting real problems, students are encouraged to analyze, evaluate, and seek solutions from a deeper perspective. This process requires them to not only passively receive information, but to process it in a more analytical and critical way. This is because, by nature, case methods focus on solving complex problems, which often do not have one correct answer. Thus, it is very relevant to develop students' critical thinking, because students need to consider various viewpoints and potential solutions (Kirmizi et al., 2015; Laurillard, 2016; Susetyo et al., 2017). In this process, students are invited to map the problem thoroughly, explore the main causes, and think about the steps that must be taken to overcome the problem.

In its application, the case method is usually carried out in the form of group discussions, where each student contributes their thoughts and opinions. These discussions not only train students to think critically but also hone their communication and collaboration skills. Each member of the group is faced with the need to build strong arguments, listen to the opinions of others, and provide constructive responses. This process is crucial in developing critical thinking skills because students learn to not only think of the best solution individually, but also to consider how those solutions are received by others with different perspectives.

The effectiveness of the case method also lies in the way students are invited to interact with teaching materials, not just theory, but also real situations that demand the right decision. Students not only learn about existing concepts, but also learn how to apply those concepts in practical situations. This fosters higher analytical skills as students must be able to assess the various information available, select relevant information, and make decisions based on existing evidence. In addition, students are also invited to consider the risks, benefits, and long-term impacts of each decision taken.

The case method also provides space for students to do self-reflection. After delving into a case and looking for a solution, students are allowed to evaluate the decisions that have been made. This will later help in identifying solutions or problem solvers that have been carefully considered, and that may still be improved. In this way, students not only learn from experience, but also from mistakes or inappropriate decisions, which are very useful for their future development of critical thinking.

Case methods have many benefits, but there are some challenges in their implementation. One of them is time limitations. Complex cases often take a considerable amount of time to analyze and discuss, while in limited learning settings, time is often a holding factor. In addition, not all students feel comfortable actively participating in discussions. Some students may be more inclined to be silent, which can reduce the dynamics of the discussion. Therefore, the role of the teacher becomes crucial in managing discussions and ensuring that all students are engaged.

The involvement and role of lecturers also have an important influence on the implementation of lectures using the case method. The role of lecturers is indispensable in managing class discussions so that they are able to guide students to focus on the core of the problem, encourage them to ask critical questions, and provide the necessary direction to keep the discussion productive. Therefore, the success of this method is highly dependent on the teacher's facilitation skills, as well as the readiness and involvement of students in the learning process.

Result of Pretest and Posttest of The Case-Based Method

The statistical results indicating the influence of the Case-Based Method (CBM) on critical thinking, particularly when supported by learning motivation, are highly relevant for informing effective pedagogical practices in higher education (Mahdi & Almuslamani, 2020; W. Yang et al., 2024). The significant statistical findings demonstrate that CBM effectively enhances students' critical thinking by engaging them in analyzing real-world cases. (Mahdi & Almuslamani, 2020; W. Yang et al., 2024). This suggests that students are not merely passive recipients of theoretical content, but are actively involved in evaluating and solving contextually grounded problems (Mahdi & Almuslamani, 2020; W. Yang et al., 2024). Such engagement fosters deeper cognitive processing, encourages students to consider multiple perspectives, and promotes more structured and reflective reasoning (Mahdi & Almuslamani, 2020; W. Yang et al., 2024). Consequently, CBM emerges as a highly effective instructional strategy to develop the critical thinking skills necessary in today's complex and dynamic world.

Furthermore, the positive impact of CBM on critical thinking is closely associated with the enhancement of students' learning motivation (W. Yang et al., 2024). This method not only fosters greater student participation but also increases their motivation to engage in discussions and collaborative problem-solving (Yuliana & Nandiyanto, 2023). When learning is contextualized through real-life case scenarios, students perceive the learning process as more relevant and applicable to their lives (W. Yang et al., 2024). As a result, they become more responsible and proactive in developing their critical thinking abilities (W. Yang et al., 2024). Accordingly, integrating CBM into instructional design can be a comprehensive strategy to promote both motivational and cognitive engagement in the classroom.

CBM also supports active learning by encouraging students to engage in group discussions, construct arguments, and solve problems based on the information provided in case scenarios (Hodijah et al., 2022). Such active participation enhances students' motivation and contributes to more meaningful and skill-based learning experiences (Yuliana & Nandiyanto, 2023). Instead of being passive recipients, students become active agents in the learning process, playing central roles in critical reasoning and problem-solving (Aliman et al., 2020). This shift enables a more constructive learning environment, where critical thinking and motivation are developed simultaneously.

The improvement in students' critical thinking resulting from CBM implementation also has implications for long-term learning outcomes. As students consistently engage in deep analysis and evaluation of case materials, these cognitive skills become transferable to various real-life contexts (Asih et al., 2022). This cultivates flexible and applicable thinking competencies that extend beyond the classroom (Hodijah et al., 2022). Thus, the effectiveness of the CBM model provides a strong foundation for curricular reform aimed at preparing students to navigate future academic and professional challenges.

Result of The Effectiveness Test of The Case-Based Method on Critical Thinking

The findings of this study are supported by (Hodijah et al., 2022), who explained that the application of case-based learning has a significant impact on students' ability to identify problems, gather information, solve them, and present the outcomes through individual or group analysis.

Overall, the case-based method is a highly effective pedagogical strategy for developing students' critical thinking skills by immersing them in real-world problem-solving and collaborative discourse (W. Yang et al., 2024). This method enables students to acquire not only more applicable knowledge but also sharper, higher-order thinking skills (Billah et al., 2019). Such processes help equip students with the necessary capabilities to face complex challenges in both professional and everyday settings.

Based on the statistical evidence, these results provide compelling justification for the broader application and development of the CBM in higher education contexts (Sanchez & Castillo, 2020). Case-based education has been proven to foster an interactive learning environment and is therefore highly recommended across various academic disciplines (Yuliana & Nandiyanto, 2023). Furthermore, a deeper understanding of the relationship between learning motivation and critical thinking development can aid educators in designing more targeted and responsive learning strategies (Khairani et al., 2020)

The Interaction of Case-Based Methods with Learning Motivation for Critical Thinking Conclusion

This study shows a significant difference between the use of the Case-Based Method (CBM) model and conventional learning on students' critical thinking skills. The Case-Based Method model, which focuses on real-world case analysis, is more effective in improving critical thinking skills. A case-based approach can increase students' active involvement in the learning process, which in turn improves their ability to think critically (Block, 1996; Jianli, 2012; Pihlanto, 1994). Using this method, students not only passively receive information but also engage in discussions that encourage them to evaluate, analyze, and draw

conclusions independently. In contrast, conventional learning, which is generally more instructional and focused on the lecturer teaching, provides less space for students to develop critical thinking skills. This is supported by research from Ennis, which shows that traditional learning methods tend to place less emphasis on the development of critical thinking skills, so students are more often used to short-term memory and are not used to analyzing problems in depth (Ennis, 1991). However, conventional learning models still have a place in education, but when combined with more interactive methods such as CBM, the results can be more optimal in encouraging students to think critically.

The results of this study underline the importance of developing and implementing learning models that can stimulate students' critical thinking. The success of the Case-Based Method in improving students' critical thinking skills also shows the need for further training for lecturers in designing and implementing effective case-based learning. Therefore, the integration of methods such as CBM in the higher education curriculum is highly recommended, especially for courses that require problem-solving and in-depth analysis.

Another result of this study is that there is no significant difference between students' learning motivation and critical thinking skills. Although learning motivation can affect academic achievement, the results of this study suggest that learning motivation is not always directly related to improving critical thinking skills. Learning motivation is an important factor in academic achievement, but it cannot directly guarantee an improvement in critical thinking skills (Artino et al., 2012). In this case, critical thinking skills are more influenced by learning methods and active interaction with the material, rather than simply motivational encouragement. Student learning motivation may be more focused on achieving short-term goals, such as grades or graduation, rather than developing cognitive skills such as critical thinking. Although motivation plays a role in improving learning performance, it is not always comparable to improving critical thinking skills, which require a more in-depth and reflective approach (Lo et al., 2022; Nur'aini et al., 2020; Riswanto & Aryani, 2017). This indicates that although students are motivated to learn, other factors such as teaching style, activity in learning, and learning context are more dominant in developing critical thinking skills.

It is necessary to underline the third finding of this study, which shows that there is no significant interaction between the use of the Case-Based Method learning model and learning motivation on students' critical thinking skills. Although CBM can improve critical thinking skills, learning motivation does not play a role in strengthening the relationship between these learning methods and improved critical thinking. This is contrary to the theoretical view that learning motivation can amplify the impact of certain learning methods, and intrinsic motivation can increase learning effectiveness (Deci & Ryan, 2008). However, these findings suggest that although learning motivation exists, it is not enough to create interactions that reinforce CBM's impact on critical thinking. A possible explanation for these findings is that although students have motivation to learn, the influence of the learning models used (such as CBM) is stronger in facilitating the development of critical thinking skills than just motivational encouragement. While motivation can motivate students to participate, other factors, such as active involvement in learning, play a greater role in improving their critical thinking skills (Filgona et al., 2020; Lin et al., 2017; Urhahne & Wijnia, 2023). In other words, learning motivation is not enough to overcome the limitations in the teaching methods used.

Based on these findings, it is important to understand that learning motivation is one of the factors that support academic success, but it is not enough to significantly improve critical thinking skills. These results provide important insights for educators to consider that learning motivation alone is not enough to improve critical thinking. A more integrated approach is needed, where active learning methods such as CBM are the main factor in improving critical thinking skills. Therefore, lecturers should not only focus on developing student motivation but also on designing learning experiences that encourage deep engagement and the development of critical thinking skills. Lecturers need to create a learning environment that is not only motivating but also activates the critical thinking process through appropriate methods and in-depth interaction with the subject matter. In the future, further research is needed to explore other factors that can affect students' critical thinking skills, such as emotional intelligence or social support.

Conclusion

The Case-Based Method implemented in the Population Geography course has a positive impact on stimulating students' critical thinking based on learning motivation. It confirms the importance of making learning more contextual by improving the quality of learning. In addition, it also has a significant effect in increasing student activity during lectures. By achieving the objectives of important aspects considered in this study (identify problems, find information, solve problems, and present the results of individual or group analysis), students can reveal facts, able to formulate

data into mathematical models (STEAM), able to solve problems, and able to provide arguments. By increasing students' learning motivation through a more relevant and applicable approach, the Case-Based Method not only improves the learning process but also prepares students to become individuals who are more skilled in solving problems and thinking critically. Therefore, the implementation of this model can have a broad impact, both in the short and long term, on the progress of learning and the development of student skills. In addition to supporting IKU/KPI (Key Performance Index), the implementation of the case-based method is very relevant to learning geography, specifically in the Population Geography course, which is very close to the student environment. This learning model provides an increase in student enthusiasm, can be applied to subsequent research, and can also be developed into learning models, both technically and in the development of facilities used in the application of this case-based method learning model, in order to create a more attractive lecture atmosphere. And supported through the role of lecturers as good evaluators, motivators, and facilitators in the lecture process.

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Conflicts of Interest
The authors disclose that they have no actual or perceived conflicts of interest.

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